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TRAUMATIC INTESTINAL RUPTURE, WITH SPECIAL REFERENCE TO INDIRECT APPLIED FORCE.[1]

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THIS subject merits much more conscientious consideration than is usually given to it by surgical authors. I have reference to internal injuries with no manifest external lesions. The degree of injury is no criterion whatever as to the future aspect of the case. Frequently a slight abdominal contusion is followed by great damage to the underlying viscera; while, conversely, a crushing injury to the abdominal parietes, severe enough to cause fracture of neighboring bony structures, will not have interfered with the integrity of the abdominal organs. I wish to lay stress on the importance of the absolute necessity of examining carefully all patients suffering from abdominal contusions, and of cautious observation for a requisite period after the time of injury to preclude the possibility of having made a diagnosis of simple abdominal contusion. Then, having assured the patient and his friends of a quick recovery, only to hear later that the patient became suddenly very ill, and in all probability died from a perforative peritonitis.

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Relatively speaking, how often we hear of a fracture of the skull or severe injury to the cranial contents having been diagnosticated by the first surgeon in charge as a simple scalp contusion.

FREQUENCY OF SEGMENT OF INTESTINE INVOLVED. These injuries are found most often in men and young adults, by reason of their greater exposure to injury. In a study of the statistics of the relative frequency of rupture of the different portions of the intestinal tract, no mention is made in many instances of the exact anatomical location of the lesion.

Jalaguier claims that in all contusions of the abdominal wall, in which the viscera are injured, the digestive tube is involved in one-eleventh of the cases. These statistics are based upon those of Thomas Morton, 234, and those of Coull Mackenzie, 111, making a total of 345, of which 31 concerned the gastrointestinal tract. Chavasse found the ileum and jejunum injured 106 times, large intestine 19, duodenum 7, small and large intestine together 7, and the rectum 1. Curtis, in 113 cases, found the large intestine injured only 4 times. Bryant, in a series of cases, gives the duodenum 2, jejunum 7, and the ileum 10. Croft, in 10 cases, collected between 1873 and 1890, states there were 7 of the ileum and 3 of the jejunum. Maylard recorded 10 cases, of which 6 were injuries of the ileum and 4 of the jejunum. Poland discovered 5 cases of rupture of the large bowel out of 64 injuries to some portion of the intestinal tract. In 40 cases of rupture of the small intestine, only 4 occurred in the duodenum. It will be seen that while the duodenum is firmly fixed in its position, it is, comparatively speaking, rarely injured. It is protected by its thick walls and also by its deep position.

As we proceed in a downward direction to the ileocæcal valve, traumatic rupture becomes correspondingly more frequent. This condition is explained by the greater exposure, especially of the ileum; the mobility of the intestinal coils, and by the gradual attenuation of the tunics of the small intestine. The large bowel is protected in the loin and hypochondriac region. Its contents, which are usually of a semisolid or solid consistency, militate against injury; while we know that the fluid contents in the small intestine play an important role in rupture.

The stomach is rarely injured, on account of its protected position.

Coull Mackenzie, in 111 cases, found the stomach injured only once, and then there was an accompanying injury of the spleen, showing that great force had been exercised.

MECHANISM OF INJURY. Speaking in a general sense, blows directed above the level of the umbilicus are unlikely to cause intestinal injuries. There are certain injuries which should invite suspicion of rupture. Thomas Bryant has well said: "When an individual has been run over, the wheel passing over the abdomen or back, had a kick from a horse, a fall from a height or a crush between two obtuse bodies, there is a great probability of injury to some solid viscus or laceration of the intestine." The usual nature of injuries which produce rupture is shown by the 149 cases of gastro-intestinal involvement collected by Chavasse: 36 were due to kick of a horse; 13 were due to kick of man, blows by clubs, etc.; 23 were due to crushing of wagon wheels. It is obvious that we must first consider the force applied in consideration of the mechanism of the injury. We may classify such force into first, direct; second, indirect.

By direct force I mean that the vulnerating body has been applied in the nearest line to the exposed intestines—that is, against the abdominal parietes. By indirect force, I wish to call attention to an impulse conveyed to the intestines by an impact directed upon the buttocks or the lumbar region. Again, we can classify such injuries in regard to the nature of the applied force into (1) percussion and (2) compression. Strictly speaking, the great majority of cases of traumatic rupture of the intestine are due to compression, although there is only one vulnerating body. A blow is administered upon the abdominal wall; but the rupture is due to the compression between two solid bodies; that is, the vulnerating force and the vertebral column behind or the bony pelvis. This is substantiated by Makin's observation, that intestinal ruptures are found most often in that portion of the intestine which is low in the pelvis. There are undoubtedly ruptures produced in the true sense of percussion—that is, the impulse of the blow might cause violent momentary vibrations in a coil of intestine overdistended with fluid contents, and thus cause a rupture. This supposition is supported by the fact that in the great majority of cases the rent in the bowel is at the convex surface, diametrically opposite the mesenteric border. All cases of rupture produced by indirect force would be effected in this manner.

In a careful search of the literature, I have found only 2 well-authenticated cases of rupture produced in this manner, both of which were published in 1902.

Dr. J. F. Bottomly reports a case where the patient was struck in the back below the left shoulder-blade by an approaching wagon. Operation showed a perforation of the first portion of the jejunum. Westbrook describes a case where a wagon-pole struck a man in the lumbar region. Autopsy revealed a rupture at the junction of the duodenum and jejunum large enough to admit two fingers.

I wish to report the following case as illustrative of an injury to the intestine, which was produced in a unique way, and shows the possibility of a force of small degree directed upon the buttocks, capable of producing intra-abdominal laceration.

Mrs. J. F. O., aged twenty-six years, married; previous health good; on July 17th, at 6 P.M., while hurrying into her house to escape a thunder-storm, slipped and fell, striking the ground upon the right buttock. She had just partaken of a hearty supper. No immediate alarming symptoms were noticed, and the patient retired as usual. At midnight she awoke with severe abdominal pains; vomited once. The following day she was seen by her physician, Dr. G. F. Berger, who prescribed opiates and turpentine stupes. The pains increased and the patient rapidly grew worse. I was called in consultation on the morning of the 19th. The appearance of the patient was critical. She had an anxious expression, and complained bitterly of abdominal pains. Temperature, 104.3° F. (rectal); pulse, 140. Manual palpation revealed diffuse abdominal tenderness. There was marked tympany, most noticeable over a limited area in the region of the appendix. Without the history of the injury a diagnosis of appendicitis would have been the most probable. A provisional diagnosis of perforative peritonitis was made, and the patient advised to undergo immediate operation. She was transferred to the German Hospital. Stimulation with strychnine and salt solution enemata.

Operation. Anæsthetic, ether, by the open method. Median incision, four inches long, below the umbilicus. Upon opening the peritoneal cavity there was an escape of cloudy fluid, but no gas. Spider-web adhesions of the great omentum, which were separated, followed by a gush of fluid heavily loaded with fibrinous flakes. Small intestine was greatly distended and of a bluish-black color, and covered with a fibrinous exudate. No collapsed bowel seen. The intestine was now grasped at a fixed point by an assistant, and a search for the perforation made. After a long exploration a sudden escape of gas was noticed deep down in the pelvis. Further examination revealed feces in the peritoneal cavity, and a small perforation, about the size of the little finger-nail, was discovered on the convex surface of what appeared to be the lower portion of the jejunum. The patient was now nearly pulseless, and she was given a subcutaneous injection of salt solution. The abdominal cavity was next thoroughly cleansed by dry sponging, and the perforation in the intestine sutured into the abdominal wound. The lower angle of the incision was left open, and four large gauze drains were placed into the abdominal cavity, two in the direction of the pelvis, and two well up toward the diaphragm. This drainage was supplemented by a tubular drain. The patient was returned to her room in a very weak condition. She was stimulated with strychnine, camphorated oil, and salt enemata; each administered every three hours, but given at such intervals that the patient had one of these stimulants every hour. The patient rallied, and on the second day was in a fair condition. She recovered entirely from the operation, but the fistula persisted, and the adjacent surface was aroused into a severe dermatitis due to the digestive action of intestinal fluids. I saw her one week after the operation, and she was in good condition. I did not see her again until October 3, 1903, she in the mean time having been treated by Dr. Berger. I found her very much emaciated, literally having starved to death. She had been nourished for eleven weeks per rectum. Food taken by the mouth greatly increased the discharge, and appeared undigested at the opening. The fistula was still patent, in spite of the repeated cauterization with the Paquelin cautery. During the last two days she had two sinking spells. I advised immediate operation as the only means of saving her life; although the wound was unfavorable for operation, on account of the dermatitis.

A second operation was performed October 4, 1903. Two curvilinear incisions around the fistula were made; then a layer of gauze with an opening in the centre was sutured to the wound margins. The opening in the gauze exposed the field of operation and the layer of gauze protected the wound from the surrounding infected skin. The loop of intestine was dissected loose from the abdominal wall. The general peritoneal cavity was next packed off with compresses. The margins of the fistula were trimmed and closed by transverse suturing with two rows of continuous sutures. The first row was passed through all the intestinal coats, the second being Lembert sutures. The line of suture was covered with an omental graft, and the repaired intestine dropped into the abdominal cavity. The external wound was closed without drainage. The patient bore the operation well. The following day she was given peptonoids, two ounces every four hours per rectum. October 6th, peptonoids were given by mouth, and then, October 9th, white of an egg; October 10th, milk; October 11th, oatmeal; October 12th, soft-boiled eggs and bread; October 14th, steak. Her recovery was perfect, and she left the hospital October 23, 1903. I heard from her November 19th. She had gained twenty-five pounds, weighing more than ever before in her life.

REMARKS. The history of the cause of the injury was reliable, and that the fall was not severe I can vouch for, as she complained of no soreness in the region of the buttock, nor was there any bruise visible. I did the enterostomy for two reasons, and believe it was the means of saving the patient's life. First, on account of the collapsed state of the patient, requiring rapidity of execution, and, second, because of the paralytic state of the intestine, overdistended with gas, allowing its evacuation as the bowel regained its tone.

The state of the abdominal muscles at the time of injury plays an important role in intestinal injuries. A blow delivered upon a rigid abdomen loses considerable of its force; while an impact directed against the same structure in a relaxed state is transmitted directly to the underlying intestinal coils, and enhances the liability of a rupture. This assertion has been demonstrated beyond a doubt by the beautiful experiments of Eichel.

He first made a series of experiments upon dogs profoundly etherized. The animals were placed upon the back, the extremities being tied and extended. A forcible blow was struck upon the abdomen with a heavy club. The experiments were all negative, laparotomy showing the intestines intact and only slight extravasation in the tissues of the abdominal wall. The same experiments were performed on dogs which had been overfed for two days in advance, but the results were also negative. In another series of experiments the hind-legs were loosened before the stroke. In the first experiment the blow was delivered too high, producing a rupture of the liver. The stomach wall was also the seat of suggillation. In other experiments a hammer was used instead of a stick to produce the trauma, and rupture of the intestine was almost invariably produced. Experiments were also made by striking the lumbar region, the intestines having previously been insufflated with air through the rectum, but no rupture of the intestines was produced. Chauveau maintains that the reverse is the rule. He claims that contraction of the abdominal muscles diminishes the abdominal cavity, and also immobilizes the intestinal coils, and thus favors rupture. This argument, however, should bear no weight, as it stands simply as a personal conviction, or rather an hypothesis, while Eichel's opinion rests upon the firm basis of experimental research. Other conditions may predispose to injury, such as adhesions, alteration of intestinal walls, old reducible hernia, in which the intestinal walls have been weakened by pressure. There has been much discussion as regards gaseous distention facilitating rupture. Longuet, in 1875, claimed that the elasticity of the gas was unfavorable to rupture, while liquid distention favored it. This theory was accepted by Mugnier. The hydrostatic pressure of intestinal fluids is evidently the cause of rupture in those cases produced by indirect force. That gaseous distention would act as an elastic cushion seems plausible.

PATHOLOGY. From a pathological standpoint, we can divide these injuries into (1) contusions; (2) rupture: incomplete, complete.

Contusions may be of all degrees, either a simple interstitial ecchymosis or a submucous infiltration; or else there may be an infiltration through the entire thickness of the intestinal coats. The contused surface is more or less rounded or oval, and the long diameter is usually in the long axis of the bowel. The color of the ecchymotic area depends upon the amount of infiltration, and is usually white or yellow. The surface is denuded and covered by an exudate. Sometimes different areas of contusion are found in the same intestinal loop, or in different loops in the same region. Contusion probably is often produced and causes no untoward symptoms. However, there are cases on record where, after an injury, the patient progressed well for days or even weeks, when there arose suddenly symptoms of a perforative peritonitis, and the autopsy revealed a perforation. At the time of the accident there was a contusion produced, which in time became the seat of an infection; or else, by reason of an interfered-with circulation, a necrosis resulted, which compromised the integrity of the intestine. Thomas Bryant reports 2 cases of delayed rupture. One progressed favorably after the accident until the nineteenth day, when the patient died. Necropsy showed perforation of the duodenum, and an ulcer on the posterior wall of the stomach. In the other case there was a perforation on the fifth day. Autopsy demonstrated a perforation of the ileum four inches above the cæcum. Incomplete ruptures, when one or two of the tunics are torn, in all probability are frequent; however, as far as pathological investigation can be pursued, they are supposed to be rare. In a case observed by Jobert, in 1825, ecchymotic spots were found in the small intestine, and a rupture of the longitudinal fibres of the colon discovered. Poland reports 2 cases of such ruptures in the stomach; in 1 the mucous coat was torn, and in the other the peritoneal coat.

Complete ruptures, when all the tunics are ruptured, are more often brought to view on the operating table and in the post-mortem room. Chavasse, in 149 cases, found this condition 14 times; duodenum, 1; junction of duodenum and jejunum, 3; jejunum and ileum, 10.

Complete ruptures are usually single, but may be multiple, especially following the kick of a horse. Moty claims that there are often two perforations corresponding to the two lateral extremities of the horseshoe. It is a marvellous fact that a contusion of sufficient intensity to cause a complete rupture does not often injure other viscera; for Coull Mackenzie, in 111 cases, only found 2 with accompanying injury to the spleen and liver. The rent in the intestine always occupies the point diametrically opposite the point of the mesenteric insertion. It is sometimes a clean-cut wound, and sometimes the border is ragged and irregular. Leakage after rupture is hindered and even entirely prevented through two factors. We must remember there is no abdominal cavity in reality, the whole of the visceral contents being so closely and equably brought into contact by the pressure of the abdominal muscles and the diaphragm that considerable force is required of the intestinal contents to overcome this. The influence of the pressure of the abdominal muscles upon the intestinal contents is well known clinically; because if an injured coil of intestine protrudes from the abdomen devoid of the intra-abdominal influence, extravasation takes place much more readily. The intrinsic contractility of the intestinal tunics is another inhibitory agent against extravasation. Travers long ago pointed out that in a puncture of the gut, or even an incision two or three lines in length, an eversion or prolapsus of the mucous membrane takes place, and hermetically seals the opening. If the aperture is more than four lines in extent the protuberant mucous membrane is incapable of protecting the perforation. The protrusion of mucous membrane is due to the retraction of the longitudinal fibres. There is also contraction of the circular muscular fibres around the protruded mucous membrane, according to Jobert; thus, temporarily at least, preventing extravasation. Even in extensive complete rupture there is little likelihood of visible fecal extravasation, for Makins, in an exhaustive report of 20 cases, in St. Thomas' Hospital, London, found no appreciable escape of fecal matter.

SYMPTOMS. As this pathological condition is usually the consequence of a severe trauma in the neighborhood of the sympathetic centres, we usually find the classical symptoms of shock. The more serious symptoms soon pass away, unless there is injury of the abdominal viscera or internal hemorrhage, which is denoted by long-continued shock. If there is intestinal rupture, with fecal extravasation, the symptoms of shock merge into those of a general perforative peritonitis. It is difficult to tell where shock ends and peritonitis begins. In an injury produced by a sharp blow, the resulting shock appears more marked than that which follows a severe compression of the abdomen. In cases of contusion or incomplete rupture of the intestine, after the symptoms of shock have subsided, there is some temperature on account of local peritonitis, but not much variation in the pulse. Constipation or diarrhœa may be present and possible blood-stained stools. There is slight pain and abdominal tenderness upon pressure. Such cases, as a rule, follow a favorable course, but may terminate disastrously by reason of secondary perforation internally, or favorably by rupture externally, causing a fecal fistula. In those cases where the contusion is followed by immediate extravasation of the intestinal contents into the general peritoneal cavity, an entirely different picture confronts the surgeon. There is immediate excruciating localized pain. The face is pale, the pupils dilated, respiration superficial, the pulse small, and the temperature subnormal. This complexus of symptoms is soon followed by vomiting. The abdominal muscles are at first fixed and contracted, which is gradually followed by a ballooned abdomen; while respiration becomes of a costal nature. The symptoms now progress rapidly from bad to worse; shallow costal respiration gradually merges into dyspnœa; the anxiety of the patient becomes intense; the eyes are sunken; the pulse thready; the extremities cold and cyanosed, and the patient dies in collapse. These symptoms are the usual outcome in cases of complete rupture. However, the gravity depends upon the condition of the intestine, whether empty or distended, and also upon the virulence of the infective bacteria. Violent visceral injuries may cause no immediate symptoms. Michaux, out of 100 cases of grave contusions, had 10 cases where patients followed their vocations long after injury, in some of which there was complete laceration. Rioblanc reports 2 similar cases. Poland mentions a case of a child, aged thirteen years, struck upon the abdomen, who walked a mile after the injury, and died thirteen hours later. There was a complete rupture of the duodenum. Holland mentions a girl, aged eleven years, who fell down a flight of stairs. She vomited and then had no symptoms for twenty-four hours, when she died. Autopsy showed rupture of one-half of the jejunum. Chavasse speaks of an injury by kick of a horse at 3 A.M. Patient had severe pain and then felt well until the following night, when he vomited and died in collapse. Postmortem revealed a complete rupture of the jejunum.

I wish to call attention to retroperitoneal emphysema as an indication which signifies injury to the duodenum or the colon. The loss of liver dulness is an orthodox symptom in many text-books on surgery. This diagnostic resource is by no means infallible, especially if the laceration is limited. While fecal matter is less prone to escape than gas, the latter may escape in very small quantities. Again, we should remember that these injuries usually lie toward the pelvis and the upper quadrant of the abdomen may be isolated by omental adhesions. It is obvious that where a great quantity of gas was liberated in the general peritoneal cavity, the liver would fall away from the abdominal wall, so that a resonant note would be heard but not always, as a highly distended bowel may encroach upon the liver dulness.

Vomiting is considered of great diagnostic importance by many. Trendelenburg and Berndt consider it almost a positive sign of rupture. Berndt claims that in contusion of the abdominal wall without rupture, there may be slight vomiting, it being entirely a reflex process, but in complete rupture peristalsis forces the intestinal contents into the opening, and thus irritation of the cut end of the nerves causes vomiting. While continued interrupted vomiting is by no means absolute evidence of rupture, great weight should be placed on its presence in connection with other corroborative symptoms. The abdominal rigidity soon after injury is ominous. Hartmann, in 37 cases, found rigidity 17 times. He treated such patients by laparotomy, and found visceral injury in each. In the 20 other contusions there was no rigidity; the patients were treated expectantly, and all recovered. Kirstein also dwells upon the importance of this symptom.

PROGNOSIS. The prognosis depends upon certain conditions. An injury soon after a hearty meal, while there is a copious physiological secretion of intestinal juices, would, of course, facilitate extravasation. The prognosis of wounds which are inflicted in the duodenojejunal region is relatively bad, because they are near the source of secretions and because of the difficulty in dealing surgically with this anatomical region. Horse-kicks upon the abdomen have usually an especially bad prognosis. However, Pech reported 67 cases during the years 1890 to 1897 at the garrison of Luneville, France, with only 2 deaths, treated upon the conservative plan. These statistics seem improbable. Dubujadoux observed 8 contusions from horse-kick, and found intestinal lesions 8 times. The mortality of these injuries in the past has been shocking, and it is only due to the great advance of surgery in the last decade that statistics give a more cheerful aspect.

In 1896 Petry collected 160 cases of rupture of the intestine treated expectantly, of which 149, or 93 per cent., died, and 11, or 7 per cent., recovered. He also collected 42 cases of rupture of the stomach and intestine which had been operated upon; 14, or 33.6 per cent., recovered, and 28, or 66.7 per cent., died. Kirstein collected 18 cases operated upon from the German literature since the publication of Petry's paper, of which 44.5 per cent. recovered and 55.5 per cent. died. D. N. Eisendrath collected statistics of 40 cases of which 19, or 47.5 per cent., recovered, and 21, or 52.5 per cent., died. The prognosis of the future will rest upon an early diagnosis. Immediate operation will reduce the mortality to a minimum. The statistics of Siegel, which I consider of the greatest scientific importance, bearing upon this subject, are as follows: In 532 cases treated expectantly, the mortality was 55.2 per cent.; in 376 cases operated upon there was a mortality of 51.6 per cent. An analysis of these statistics proves that the high mortality is due to late operation, when a general peritonitis had already developed. When the time of operation is taken into consideration, the true status of early aggressive surgery can be conceived, as is proven in a further study of Siegel's statistics.

Cases operated upon first four hours, mortality	15.2 per ct.
" " " " five to eight hours, mortality	44.4 "
" " " " nine to twelve hours, mortality	63.6 "
" " " later	70.0 "

Treatment. In all cases of abdominal contusions the prognosis should be guarded, and the patients ought to be kept under careful observation. Upon the least suspicion of rupture immediate laparotomy is the only course to be followed. The statistics of Siegel place this argument beyond question. The surgical treatment of perforating wounds of the abdomen has been decided for all time to come, and a plea for equally decisive measures is made for this pathological condition.

The first laparotomy for rupture of the intestine was performed by Bouilly in 1883, but the case terminated fatally. Moty, in 1889, was successful in the first case on record. The incision should be made through the linea alba below the umbilicus, notwithstanding the advice of F. Spaeth to make the incision at the point of greatest tenderness. This incision will give a better survey of the abdomen. Usually the injured intestine will lie in close proximity, and if there are concomitant injuries of other organs, they can be most easily reached through such an incision. Upon opening the peritoneum there may be an escape of gas, also exudate containing albuminous flakes. The bowel should be examined methodically from a fixed point until the injured segment is found. I wish again to call attention to the great possibility of multiple rupture, especially in cases due to horse-kick. Small rents should be sutured transversely to the long axis of the bowel. Large lacerations should be dealt with by resection, provided the patient is in good condition. In all cases when there are alarming symptoms, the injured bowel should be anchored in the abdominal wound. Personally, I believe this is a good practice to follow in the great majority of cases. Intestinal drainage is of prime importance where the bowel is paretic and distended. Again, in such injuries, especially if operation is delayed, there is a zone of infection which cannot be rendered sterile by secondary disinfection; hence the great danger of tearing through of the stitches and a resultant secondary peritonitis. In the case I reported in this paper, there was a permanent fistula as a result of the operation, but the patient was in such a desperate condition and time was of such moment that the intestine was sutured to the tissues too near the skin. The proper course to follow, when possible, is to unite the bowel, but leave a small fistula and anchor the segment to the abdominal wall. This procedure has been practised by Bouilly. Verneuil, Farquhar Curtis, Treves, Thomson, and Smith have advised an artificial anus after resection of the bowel. I believe this is unnecessary, as it always insures a secondary operation, while the principles are fulfilled equally well by the procedure of Bouilly, and the fistula will close spontaneously in the great majority of cases. When it is deemed advisable to drop the repaired intestine back into the abdomen, the line of suture should always be re-enforced by an omental graft, as advised by N. Senn. When an expectant course is followed in simple contusion or in cases of ruptured intestine, when for some reason operation cannot be performed, the patient should be placed at rest, with an ice-bag on the abdomen. Feeding by mouth should be prohibited, and nourishment given by rectal enemata. Opium is indicated to diminish peristaltic action of the bowels, and thus inhibit extravasation.

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CASTRATION FOR TUBERCULOSIS OF THE TESTICLE.[1]

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Not many years ago it was generally admitted that a radical operation for extensive tuberculosis of the testicle and epididymis was indicated when only the genital apparatus was affected by the disease, the remaining organs of the body being free. In the *Deutsche Chirurgie*, edited by Billroth and Luecke, will be found Kocher's classical article on the subject. In this he says that the reason for this procedure is the chance of a radical cure, although he admits the possibility of a spontaneous recovery, but which is, in most cases, accompanied by the functional loss of the organ involved. He also points out that a cure without operation is only a possibility, and if the organ with its disease is left intact, with the hope that the affection will finally disappear, the patient is exposed to all the dangers attendant upon suppuration. In other instances the condition demands a radical treatment. In a patient having tuberculosis of one testicle which is left untreated, it is always to be expected that within a short time its fellow will also become invaded by the process. This not only applies to the other testicle, but to the whole organism as well, and if the tuberculous testicle is not removed a metastasis of the process will take place in other parts of the body, usually in the form of a general miliary tuberculosis. From this it would appear that castration is absolutely indicated, and although the prostate and seminal vesicle were enlarged and other subjective symptoms of tuberculous infection of the genital organs were manifest, Kocher noted that these symptoms disappeared in a relatively short time after castration had been done. He even found that suppuration of the spermatic cord and abscesses of the prostate would

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[1] Read by title at the French Urological Society, Paris, October 22 to 24, 1903.